Class III Re-Evaluation of

Red and Bonita Mine and Mill

and

Gold King Tunnel

San Juan County, Colorado

[OAHP SA.EP.R1]

April 14, 2015

Prepared for:
Environmental Protection Agency
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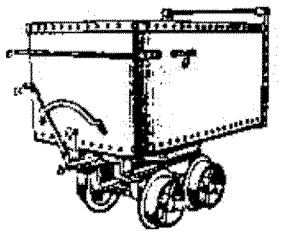

Colorado Historical Society - Office of Archaeology and Historic Preservation

COLORADO CULTURAL RESOURCE SURVEY

Cultural Resource Survey Management Information Form

I. PROJECT SIZE

Total federal acres in project: 0 — Acres surveyed: 0

Total state acres in project: 0 — Acres surveyed: 0

Total private acres of project: 15.7 — Acres surveyed: 15.7

Other _ : 0 — Acres surveyed: 0

Total acres surveyed: 15.7

II. PROJECT LOCATION

County: San Juan — Principal Meridian: 6

USGS Quad map name(s) and date(s): Ironton (7.5'), 1955

The above quadrangles predate survey for Sections. The locations below are projected from current data.

Township: 0 Range: 0 Sec: 0 1/4s 0

Legal location is unavailable because the area on the map was not surveyed for Sections.

III. SITES

Smithsonian Number	Resource Type				Eligibility				Management Recommendations						
	Prehistoric	Historical	Paleontological	Unknown	Eligible	Not Eligible	Need Data	Contributes to National Register District	No Further Work	Preserve/Avoid	Monitor	Test	Excavate	Archival Res	Other
5SA.632		X			X					X					
5SA.649		X				X			X						

ABSTRACT

Approximately ten years ago, the Environmental Protection Agency identified the Red and Bonita Mine and Mill site as a source of heavy metals and acid mine drainage. Effluent from the Red and Bonita's main tunnel trickles into Cement Creek, flowing south and joining the Animas River at Silverton, San Juan County, Colorado. Cement Creek gradually ascends north from Silverton approximately seven miles to its headwaters between high peaks in the central San Juan Mountains. The Red and Bonita mine, at one time an important gold and silver producer, is located on the drainage's east side. The Environmental Protection Agency (EPA) determined that the best approach for reducing the effluent was plugging the main tunnel deep underground, where bedrock is solid. In need of underground expertise, EPA turned to the Colorado Division of Reclamation, Mining, and Safety (DRMS) to refine plans and participate in plug siting and design. Preliminary work was started at the Red and Bonita in 2010, and a water collection system completed in 2012. Once the Red and Bonita plug is in place, EPA expects the local water-table to rise, possibly backing up into the old Gold King mine workings. The Gold King Tunnel was a completely separate operation located approximately 1,600' southeast and 400' higher in elevation on the North Fork of Cement Creek. EPA proposes reopening the Gold King Tunnel in 2015 to monitor changes in the water-table and water quality. The remediation project is a federal undertaking because of EPA's involvement and thus requires Section 106 compliance. DRMS contracted with Mountain States Historical to re-evaluate the Red and Bonita as a historic resource in 2014 and the Gold King Tunnel in 2015, the results are presented in this report.

Eric Twitty of Mountain States Historical (author of the present report) recorded the Red and Bonita (5SA.632) and Gold King Tunnel (5SA.649) in 1999 as archaeological sites for Bureau of Land Management (BLM). At that time, Twitty recommended the Red and Bonita eligible under Criteria A, C, and D, but BLM's official determination was Need Data. The Gold King Tunnel was recommended ineligible, a finding that BLM upheld. Because the level of effort surpassed Class III standards in 1999, both sites were not recorded again in 2014, but were re-evaluated instead. The re-evaluation sought to document any changes to the Red and Bonita and fulfil the Need Data determination, and define proposed remediation plans and their effect on both sites.

The Red and Bonita site was impacted by earthmoving in 2011 and 2012 for the remediation project, while work is proposed for the Gold King Tunnel in 2015. The 1999 recording is, admittedly, unclear regarding integrity and the contributing versus noncontributing elements at Red and Bonita. The 1999 recording also offers conflicting statements about eligibility and acceptable impacts to that site. In the 2014 re-evaluation, MSH concludes that Red and Bonita does, in fact, qualify for the NRHP under Criterion D and for the SRHP under Criterion E. Buried archaeological deposits amid the workers' housing complex are likely to yield important information. But the site lacked sufficient integrity for eligibility under Criteria A and C in 1999, and integrity has not improved since then. The 2011-2012 earthmoving has been limited to non-contributing portions of the site. Regarding the remediation as a Section 106 undertaking, the recent earthmoving and proposed plans for further actions will pose no adverse effect to the site.

The Gold King Tunnel was determined officially ineligible for the NRHP and SRHP in 2000 because total disturbance in past decades compromising integrity, and the finding still

holds true in 2015. Thus, any remediation actions will have no effect on the site as a historic property.

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CHAPTER 1: INTRODUCTION AND PREVIOUS WORK

Introduction

The San Juan Mountains were an important center of gold, silver, and industrial metals mining from 1874 through circa 1974. Various companies developed dozens of highly mineralized veins into substantial mines featuring extensive underground workings and large waste rock dumps. All have been long-since abandoned, and some presently introduce heavy metals and acid mine drainage into local streams, which feed into the Animas River. Draining most of San Juan County, the Animas descends southwesterly to Silverton, curves south, cascades to Durango, and provides irrigation water for agriculture beyond. The Environmental Protection Agency (EPA) and U.S. Geological Survey began intensively studying how to address the problem during the 1990s, including identifying principal sources of contamination, both natural and manmade.

Cement Creek is a major metals contributor through spontaneous seeps and a handful of large mines scattered along the drainage. The creek begins amid peaks in northern San Juan County and flows approximately seven miles south-southwest to Silverton, where it joins the Animas. Studies revealed that the Red and Bonita Mine and Mill site constantly releases effluent from its main tunnel and percolation through its mineralized waste rock dump. Privately owned, the site is on the east side of Cement Creek's main fork, near the townsite of Gladstone. The townsite is at a confluence with the South Fork extending south, the Main Fork continuing northeast, and the North Fork ascending steeply to the east.

Historically, the Red and Bonita (Site 5SA.632) was a mining and milling operation initially prospected in 1896 and brought into production two years later. A mill was built in 1898, but it was a failure because the gold and silver ore was too complex. The operation ceased around 1903. The Red and Bonita is presently an archaeological site with a main tunnel, platforms representing the mill, and debris and more platforms remaining from workers' housing. The site was bulldozed during the early 1990s, and a century of heavily mineralized drainage deposited a coating of ferricrete (iron-based cement) on the dump and the level surfaces below. The site retains marginal integrity as a historic resource.

Around 2008 EPA determined that the best way to address the Red and Bonita effluent would be to plug the main tunnel underground where rock was solid and fracture-free. Thus it would be less likely to leak when water backed up. EPA began work around 2010, reopening the tunnel after its portal had collapsed decades ago. Despite the collapse, the portal still emitted effluent. EPA found that the project was more challenging than originally supposed and recruited the Division of Reclamation, Mining, & Safety (DRMS) for its expertise in underground mine workings and engineering. DRMS is a Colorado state agency that addresses safety and environmental issues concerning abandoned mines. DRMS conducts surveys of mining districts for hazardous openings and potentially contaminated properties, and coordinates with federal agencies and private property owners as needed. According to DRMS project manager Allen Sorrenson, DRMS became involved with Red and Bonita in 2011, first studying the problem and then developing a remediation plan. The first step involved creating a simple surface system to capture effluent, which DRMS executed in 2012. The next steps, planned for 2015, will be to identify a solid plug point deep underground, to prepare the tunnel interior, and then install a waterproof concrete bulkhead.

Once the Red and Bonita plug is in place, EPA and DRMS expect the local water-table to rise. EPA proposes reopening the Gold King Tunnel (5SA.649) for monitoring purposes. The Gold King is located on the North Fork's north wall east of Gladstone, approximately 1,600' southeast and 400' higher in elevation than Red and Bonita. EPA intends to clean out the tunnel portal and construct a water collection system in order to prevent uncontrolled drainage into the North Fork. The tunnel presently seeps and this could increase if the water-table rises. The collection system involves scraping the associated waste rock dump, digging a shallow ditch, and diverting drainage into a flexible plastic pipeline that descends overland to a settling pond at Red and Bonita.

Historically, the Gold King Tunnel was the production point for one of the richest gold mines in the central San Juan Mountains. The Gold King was developed in 1890, began heavy production in 1896, and received major improvements next year. An aerial tramway carried ore from the well-equipped tunnel down to a huge mill at Gladstone, which was repeatedly enlarged. The mill also boasted one of the area's largest air compressors, among the earlier electrical plants, and a highly efficient ore treatment process. Gladstone and the mill site were erased with heavy equipment during the 1960s, and the Gold King Tunnel was totally bulldozed during the late 1980s. The site no longer retains integrity as a historic resource.

Referred to in this report as the Red and Bonita remediation project, the action at both sites is a federal undertaking because of EPA's initiation, direction, and ongoing participation. As a federal undertaking the project requires Section 106 compliance (36 CFR 800.5). DRMS contracted with Mountain States Historical (MSH) to inventory the two sites, evaluate their historical significance, determine project effects, and render management recommendations. A summary is reviewed in the subsection below and discussed in detail in Chapter 6.

Review of Inventory in 1999 and Overview of Re-evaluation in 2015

In 1999, Eric Twitty with MSH recorded and evaluated the significance of Red and Bonita as Site 5SA.632 and the Gold King Tunnel as Site 5SA.649. The work was part of a larger inventory of Cement Creek drainage commissioned by the Bureau of Land Management (BLM) in 1999. Aware of the environmental studies and their potential implications for historic resources, BLM sought fair and qualitative evaluation in hopes of influencing future remediation projects. Twitty recorded the resources in a manner surpassing the Class III standards defined by the BLM, and presented findings on site forms and in the 2000 interpretive report: *Mining Cement Creek: A Selective Inventory of Historic Mine Sites on the East Side of the Cement Creek Drainage, San Juan County, Colorado*.

Twitty (author of this 2015 report) recommended Red and Bonita eligible for the National Register of Historic Places (NRHP) under Criteria A, C, and D. Admittedly, his report provided conflicting statements about the site's integrity, raising questions about whether the site was able to clearly embody or convey its significance under the criteria. Given this, the BLM's official determination was Need Data rather than eligible.

Red and Bonita is now the subject of the remediation project described above, and is being re-evaluated as a historic resource in this 2015 report. Because the 1999 fieldwork surpassed Class III standards, the site was not recorded again in full in 2014. Instead, the re-evaluation gathered enough information to reach three goals: document changes created by the 2010-2012 work; fill Need Data gaps for a clearer statement on integrity and significance; and evaluate the remediation project's effects. The data gaps are resolved in Chapter 6, with the site

now being recommended eligible under Criterion D alone. Further discussions in Chapter 6 also clarify integrity and contributing versus noncontributing elements as of 1999 and 2014. In sum, the earthmoving between 2010 and 2012, and the work proposed for 2015, are confined to non-contributing portions of the site, or are outside the site boundaries altogether. The remediation project as intended thus has no adverse effect in terms of Section 106.

Twitty recommended the Gold King Tunnel ineligible for the NRHP in 1999 because the site lacked integrity at that time. The site had been completely bulldozed during the 1960s and early 1980s by an active mining operation, erasing nearly all historic attributes. Information and statements in the 2000 report clearly supported the recommendation, which the BLM made official. The Gold King Tunnel will be reopened and a water collection system constructed in summer of 2015, and the site is therefore being re-evaluated in this spring of 2015 report. The site was, however, not recorded again for two reasons. First, Twitty recorded the site in 1999 surpassing Class III standards and the quality of that work is able to support re-evaluation in the 2015 report. Second, the site has little left to offer because it lacks historic attributes, and further documentation is unnecessary. In terms of Section 106, the proposed remediation will have no effect because the site is ineligible.

CHAPTER 2: PHYSICAL ENVIRONMENT

The Gold King Tunnel and Red and Bonita Mine and Mill are in Cement Creek drainage in north-central San Juan County, which is famous for its mining history. The county encompasses the deepest portion of the San Juan Mountains, which form an extensive, ovoid assemblage of lofty peaks, deep valleys, and drainage basins in the southwest quarter of Colorado. Because of their complex topography, climate, and geography, the San Juans do not lend themselves to a simple overview description that would be relevant to the inventoried resources. Instead, pertinent, localized environmental aspects are described below.

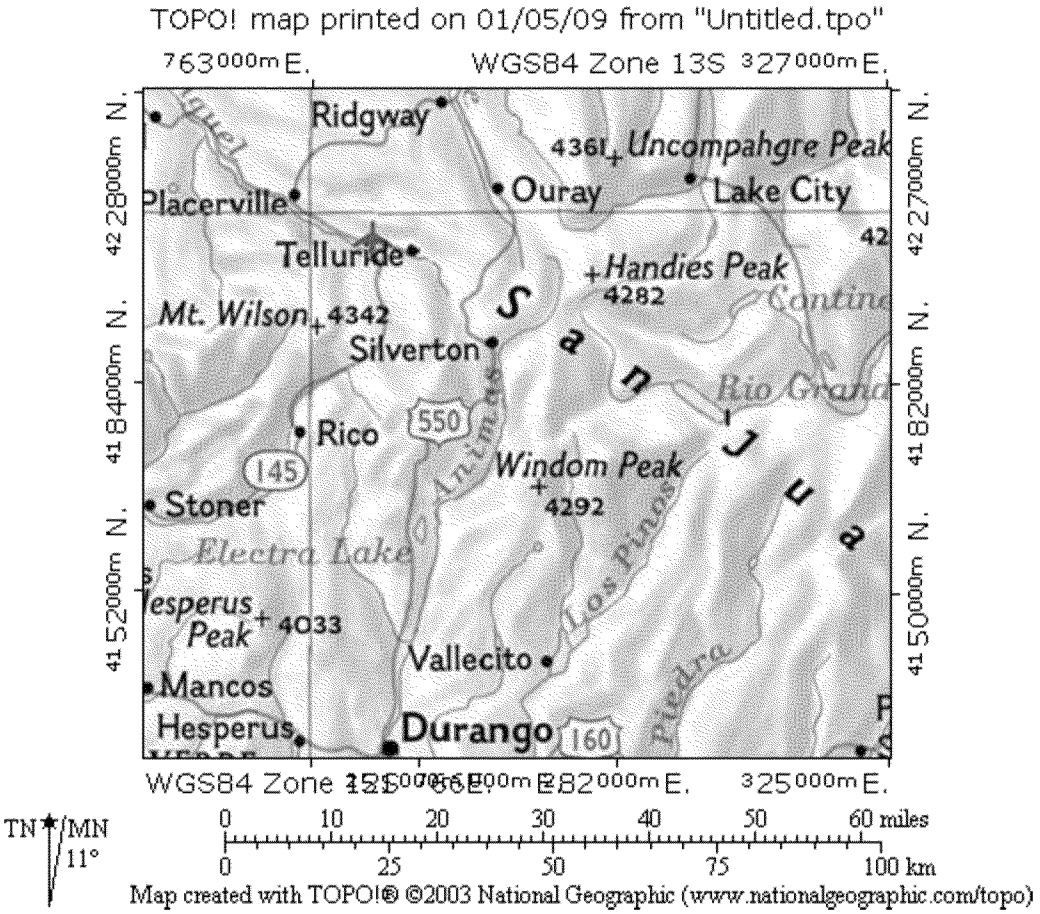

Figure 2.1 The map shows the central portion of the San Juan Mountains and principal towns. The inventoried resources are in Cement Creek drainage, immediately left of the S in San Juan. The town of Silverton is at center.

The topography of the entire county is extremely rugged, as a result of cycles of geological uplift, subsidence, and glaciation. A cluster of 12,000' to 13,500' peaks stand between pronounced valleys. The Animas River valley is the deepest of these, beginning at the confluence of several creeks in the county's northern extension. Numerous streams descend into the valley from both sides, draining basins between the principal peaks. On the north side of the Animas, the principal streams are, from west to east: Mineral Creek, Cement Creek, California Gulch, and the North Fork of the Animas.

Mineral Creek ascends northwest from Silverton, around 9,300' in elevation, and then branches. The South Fork continues west into a cluster of peaks and basins forming a divide with the Telluride area in the western San Juans. At 12,000' elevation, the basins are above treeline and feature alpine tundra and talus.

The main fork of Mineral Creek ascends due north from the branch for approximately four miles and ends at Red Mountain Pass. Tributary Mill Creek extends west into a group of peaks that were heavily prospected, and a short distance north, Porphyry Gulch ascends steeply west into Porphyry Basin. Historically, the Mineral Creek Mining District encompassed the drainage.

Cement Creek, another principal valley, ascends north from Silverton and is flanked on both sides by high peaks. Anvil Mountain rises on the west side of the drainage mouth, and Silverton lies at its base. Cement Creek trends north for around six miles, curves northeast, and reaches a confluence at the townsite of Gladstone. The South Fork ascends 1.5 miles south, and the main fork continues northeast approximately 2 miles to Ross Basin. Oddly, the North Fork climbs steeply to the east. The mountains on the drainage's east side were contained within the Eureka Mining District.

Poughkeepsie Gulch is north of Cement Creek over Hurricane Pass. Encompassed by the Poughkeepsie Mining District, the gulch descends north, flanked on the west by Brown Mountain and the Red Mountain chain, and on the east by Tuttle Mountain and highlands around Mineral Point. Half the gulch is above treeline, beginning at 11,400' elevation.

California Gulch and the North Fork of the Animas are the last two principal drainages on the north side of the Animas River. They and Cinnamon Creek join at the townsite of Animas Forks, and this confluence serves as the Animas River's headwaters. California Gulch ascends gently west, the North Fork ascends north, and Cinnamon Creek extends east. High peaks rising to elevations of 12,500' to 13,200' surround the confluence, and the confluence itself lies at a lofty 11,000'. Even though the valleys and confluence are lower than treeline, the extremely harsh climate and thin soils discouraged the growth of anything except alpine tundra, arctic willows, and groves of subalpine fir and spruce trees on some north-facing slopes. Houghton Mountain stands at the northwest corner of the confluence, separating California Gulch and the North Fork. The entire area is contained within the Eureka Mining District.

The Mineral Point Mining District encompasses a large glaciated drainage north of Houghton Mountain. The drainage is around one mile wide north-south, three miles long east-west, and descends westerly. High peaks surround the drainage, and in addition to Houghton Mountain on the south side, Engineer Mountain on the north side is the other major landmark. A cluster of hills rises on the drainage floor, and although they are comparatively low, their elevation is approximately 12,000'.

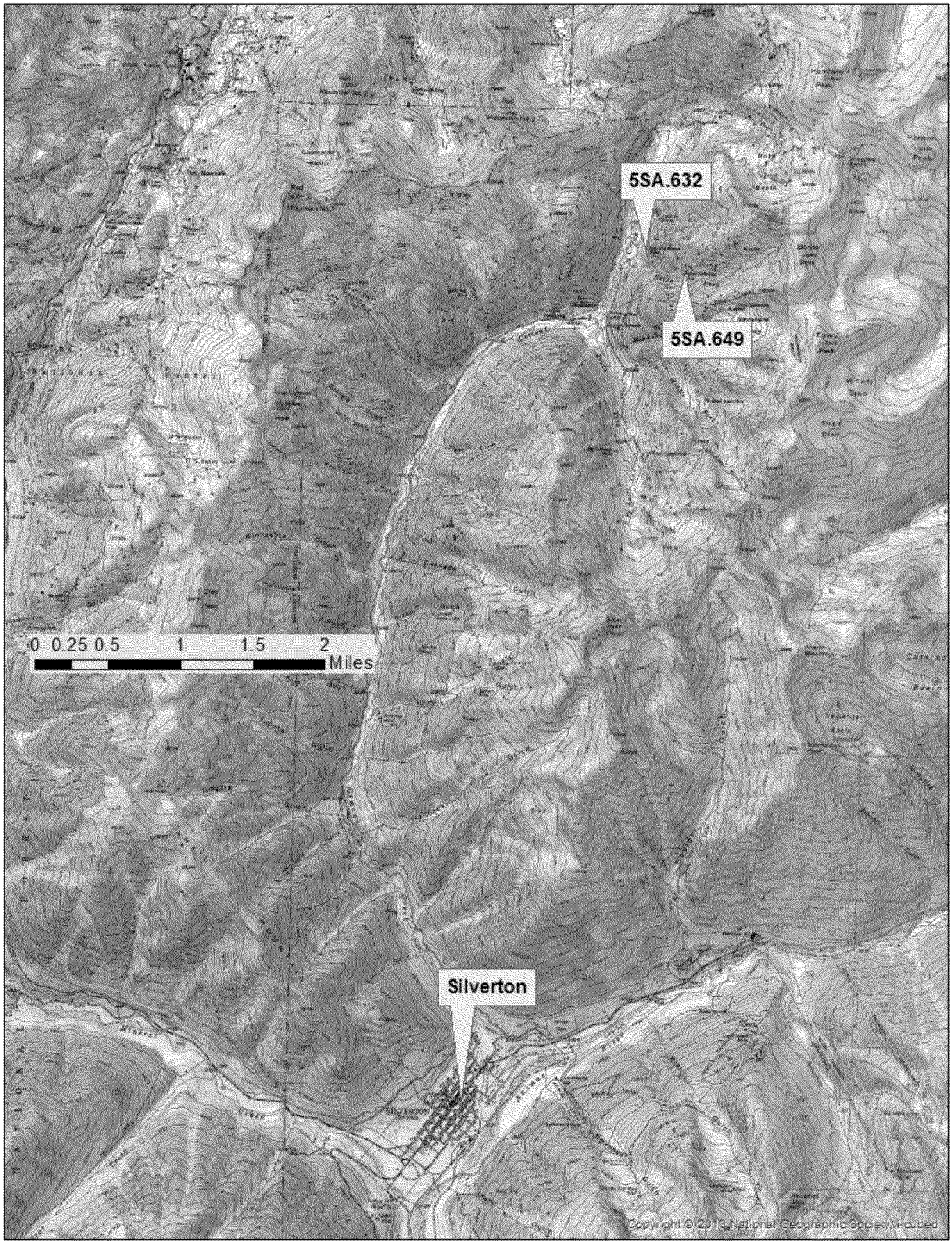

Figure 2.2: General location of Cement Creek drainage, and Red and Bonita Mine and Mill (5SA.632) and Gold King Tunnel(5SA.649).

CHAPTER 3: BRIEF HISTORY OF MINING IN SAN JUAN COUNTY

For centuries the San Juan Mountains were the exclusive domain of the Ute Indians. As early as the 1700s, Spanish, and later, American explorers, examined the piedmont areas surrounding the range, but few ventured deep into the rugged, remote, and inhospitable mountains. In 1860, the Utes saw their isolation and peace begin to erode. A party of prospectors led by Charles Baker penetrated deep into the Animas River drainage in search of placer gold. The party encountered minor amounts of the metal at what they termed Baker's Park, which was the valley encompassing present-day Silverton. While they did not locate economically-viable quantities of gold, the impact of their arrival was great. The Baker party reported that the San Juan Mountains held great promise for mining, and they proved that the area could be accessed. Over the next 10 years other prospecting parties followed, though instead of placer gold they sought hardrock gold and silver, which the San Juans offered in abundance. Their success in finding riches stimulated mining, leading to the growth of settlements such as Silverton, Howardsville, and Animas Forks. Due to the remoteness of the San Juans, and because of the threat posed by wary Ute Indians, mining developed slowly.

The Utes were not hostile at first. They understood that Whites were interested in minerals and not in extensive settlement, and they permitted prospectors to search the high country unmolested. However, as more Whites arrived conflict was imminent. Faced with the possibility of another Indian war, the Federal Government employed its typical strategy of coaxing the Indians into signing a treaty. In 1873 Felix Brunot, President of the Board of Indian Commissioners, and Otto Mears held negotiations with Chief Ouray and hammered out the Brunot Treaty. According to the agreement, the U.S. Government paid the Utes $25,000 for 4,000,000 acres of mineral-bearing land, while the Utes retained the right to hunt on the ceded territory. With the treaty in effect and the threat of hostilities mitigated, the area's isolation was the remaining impediment to mining in the San Juans.

Baker's Park was a natural nucleus for settlement in the south-central San Juans. The area offered flat land, plenty of water, and timber in the surrounding mountains. In 1870 another party of prospectors returned to Baker's Park, and re-inhabited the camp. Others followed during the next four years and erected several clusters of cabins along the Animas River, which served as crude commercial hubs and residences for prospectors. These temporary camps grew into the towns of Silverton, Howardsville, Eureka, and Animas Forks.

Prospectors based out of these small and simple settlements began investigating the surrounding mountains. During the early 1870s they made a number of silver and gold strikes which presented the possibility of profit. Ore lay in the ground, but the region lacked the infrastructure necessary to permit the input of supplies and machinery, and the outflow of payrock to railheads. In addition, the Animas River drainage was still largely unknown and unproven to investors able to provide capital. Because of these factors, mining in the region progressed slowly.[1]

To facilitate the region's development, Colorado road-builder Otto Mears, local capitalists, freight companies, and mining interests all contributed to the development of a network of roads during the 1870s. The roads connected commercial centers and the tiny and remote settlements in the mountains. While some were barely passable even after completion, they were a significant improvement over the packtrails and other routes that some people

[1] "San Juan Silver Mines – Review of the Year 1880"; Weston, 1878.

attempted to drag wagons across. The improved transportation corridors made supplies available for both mining and residence, and the few developed mines were able to begin shipping ore. Even though payrock that assayed less than $100 per ton remained uneconomical due to high freight costs, some of the area's mines did begin demonstrating profitability. In addition, the availability of domestic goods improved living conditions and the area's population began to grow. The roads also fostered a higher degree of confidence among investors, who began to supply needed capital for the development of mines and associated infrastructure.[2]

Several visionary capitalists and promoters did much to legitimize mining during this period of time. Road builder Otto Mears hired construction crews who graded additional toll roads to the principal areas of mining in the San Juans. In 1876 the directors of the Denver & Rio Grande Railroad began building a rail line from its growing network toward the San Juans in anticipation of capturing the freight business when the region finally boomed.

One of the most significant groups of financiers included the businessmen who built ore concentration mills at the various centers of mining in the region. The late 1870s saw a wave of mill construction, indicating that a substantial number of mines were finally producing ore. In 1874 Greene & Company built a smelter at Silverton, and in 1878 additional mills went up on Cement Creek, at Silverton, at Animas Forks, and at Lake City, and at least one smelter began operating at Ouray. The year 1879 saw additional smelters constructed at these and several other commercial centers. The purpose of the ore concentration mills was not to refine ore into pure bullion. Rather, the mills separated waste from unrefined metalliferous material, saving the mining companies the costs of shipping waste-laden ore and also a portion of the processing fees levied by the milling companies.

During the late 1870s millmen realized that processing the ores of the San Juans was not a straightforward endeavor. The ores produced by the various mines were inconsistent in terms of quality, richness, and complexity. Some contained predominantly gold, most were rich in silver, while others were complex blends of the above two metals with copper, lead, and zinc. Geologists found that the ores fell into two categories. The first included payrock consisting of gold and simple silver-lead compounds, which local mills were able to treat. The second category consisted of payrock that held a combination of silver and industrial metals. Even though assaying proved such ores to be high in value, local mills had great trouble concentrating the material, despite much experimentation. The only solution was to ship this type of ore to distant, properly-equipped processing centers. Until rail service arrived in the San Juans, mining the complex ore was not viable because shipping it by wagon was too costly. Luckily, many mines tapped lodes that contained enough millable ore to enable them to be profitable.[3]

The early 1880s saw several events that greatly propelling mining in the Animas River drainage. On a broad scale, mining in the San Juans attained enough legitimacy among capitalists to finally attract serious investment. Also, in 1881 the Denver & Rio Grande Railroad arrived and established the commercial center of Durango at the southern toe of the San Juans. Two investors in particular, John Porter and William Jackson Palmer, director of the Denver & Rio Grande, envisioned the future site of Durango as offering great potential. The setting was ideal to serve as a rail hub for feeder lines winding into other portions of the San Juans, its coal seams were a source of fuel for the mines and mills, and its flat land and abundant water made it

[2] Ransome, 1901:22; "The San Juan Mines".

[3] Cross, Howe, and Ransome, 1905:26.

an advantageous smelting center. By 1882, Denver & Rio Grande gangs graded a narrow gauge line up to Silverton, which afforded a direct rail link with the Animas River drainage.[4]

In 1880 Porter and Palmer purchased the Greene & Company smelter and moved it down to Durango. They erected the smelter in town under the organization of the San Juan & New York Mining & Smelting Company, and equipped the facility to process the region's rebellious silver ores that had gone untreated until this point.[5]

The impact that the railroad and the new smelter had on mining in the Animas River drainage was enormous. The rail link drastically reduced the costs of freighting supplies to the area, and it permitted mining companies to ship ores that were either too complex, or comparatively low in value. As a result, mining in the Animas River drainage finally attained industrial proportions, and Silverton became the area's major commercial, financial, and transportation hub.

Some historians claim that the Animas River drainage's mining activity reached its zenith during the 1880s.[6] This was the product of the reduced costs of mining in conjunction with a relatively high price for silver. Through the 1870s silver fetched an average of $1.21 per ounce, which passage of the Bland-Allison Silver Purchase Act of 1878 seemed to assure. The value of silver remained high until 1886 when it slipped to $.94 per ounce, and while the drop in price hurt mining in the San Juans, the industry remained profitable. Western senators, interested in boosting the price of the metal, passed the Sherman Silver Purchase Act in 1890, which inflated the price to $1.05 per ounce. However, the high value enjoyed by the mining industry proved short-lived. In the following two years, silver's value slid to $.87 amid political turmoil, and in 1893 reformists repealed the act, which precipitated the great Silver Crash and the subsequent economic depression. Overnight, the value for the white metal plummeted to $.60 per ounce, destroying the mining industry in the Animas River drainage, as well as throughout the West. Unable to break even, nearly all of the silver mines in the region shut down, and many gold mines had to suspend operations for want of capital.[7]

During the next few years silver mining remained dormant, but investors optimistically renewed their interest in gold, which still held the promise of profits. When the economy began to show signs of recovery, mining investors hesitantly furnished capital to permit the region's gold mines to resume operations. By the late 1890s, silver mining resumed in the Animas River drainage with vigor due to a collision of several crucial factors. It was at this time, and not the 1880s, that minerals extraction in the Silverton Mining District reached its peak.

First, investors were once again willing to furnish capital for mining ventures as the markets for metals improved. Second, advances in mining technologies and engineering reduced production costs, and equipment and supplies were affordable. Third, milling technologies improved, rendering low-grade silver ores economical to treat. Mills could now accomplish the separation of industrial metals. Fourth, mine and mill owners were unwilling to let their properties remain idle, and determined to see them generate income. Last, the success of the Silver Lake, Iowa, and Sunnyside mines lent legitimacy to the resources that the Animas River drainage had to offer, and inspired investor confidence in other operations.

Perhaps one of the most important factors that influenced the Silverton area's second boom was the strategy of mining and milling ores in economies of scale, which was pioneered in

[4] "Mining News" *EMJ* 12/9/82 p310; "Mining News" *EMJ* 12/30/82 p350; Henderson, 1926:11; Smith, 1982:50.

[5] Henderson, 1926:11; "San Juan Silver Mines – Review of the Year 1880"; Smith, 1982:55.

[6] Smith, 1982:51.

[7] Henderson, 1926:216; Saxon, 1959:7, 8, 14, 16; Smith, 1982:59, 92.

part by Edward Stoiber, owner of the Silver Lake Mine. To achieve production in economies of scale, mining companies used mechanization that minimized operating costs while maximizing the tonnages of ore brought to daylight. Engineering and capital proved to be the resources that made this strategy work. In this context, large-scale production remained the domain of large, well-financed mining companies.

During the late 1890s and 1900s the Silverton area saw the development of a number of heavily capitalized mining and milling operations. In Cunningham Gulch, the Gold Tunnel & Railway Company developed the Highland Mary Mine through at least three tunnels and built an advanced concentration mill and other facilities. In Little Giant Basin the Black Prince Mining Company erected a particularly large and well-equipped surface plant to serve its mine. The Smuggler-Union Mining Company's investors purchased the North Star, Shenandoah-Dives, and Big Giant properties and assembled them into a complex mining and transportation system. In the Cement Creek drainage, the Gold King Mine improved its mill and other facilities. The Silverton district's greatest large-scale mining endeavor, however, came about when Edward Stoiber, his brother Augustus, and Augustus' associates cooperated in the development of the Iowa, Royal Tiger, and Silver Lake mines. These operations shared some services, such as compressed air, transportation, electrical, and milling systems, and mined and milled the greatest tonnages of ore in the district.

In their efforts to employ engineering to achieve economies of scale, the Silverton area's mines became a proving ground for flashy and innovative technological systems. One engineering strategy was to erect dedicated ore concentration mills to separate metalliferous material from waste in large volumes. In so doing, mining companies saved money by shipping only metalliferous materials and no wastes, and carried out steps that smelters charged for. Because most of the available ores were complex and low in grade, mining companies had to employ advanced machinery and engineering to recover profitable quantities of metalliferous materials.

Another strategy employed by the large mines was to erect surface plants that could facilitate a flow of high volumes of ore while sustaining intensive activity underground. Several mines in the Silverton district, including the Silver Lake, Iowa, Gold King, Mogul, Shenandoah-Dives North Star operation, and Highland Mary found aerial tramways efficient for transporting high volumes of payrock from their mines to their mills.

Engineers also attempted to harness electricity to power mine and mill machinery. During the Gilded Age, steam was the conventional power source used by the minerals industry. Steam power required a costly boiler plant and a constant supply of either cordwood or coal, and the boilers had to be located near the point of use. Electricity was still at an experimental stage, but it held great appeal to mining engineers because it could theoretically power machinery at locations distant from the generation source. In reality, electrical technology as it existed during the late 1880s and 1890s held limited potential for applications to mining. Even so, the efforts made to use electricity in the Animas River drainage at this time are historically important, because they constitute some of the earliest attempts at generating and applying the power source on a broad scale to mining, and to industrial purposes in general.

Mining engineers had been experimenting with electricity in the Animas River drainage as early as 1888, when the Sunnyside Extension Mining Company erected a hydropower plant near Eureka. In 1889 two more powerplants went on line in the Red Mountain Mining District and at the Virginius Mine. Additional plants were built to serve Telluride mines in 1890, and the Silver Lake and Gold King mines in 1891.[8] After engineers improved electrical technology

during the 1890s, the power source, while still experimental, became an attractive means of reducing the costs of running a mine. When the mines in the Silverton area prepared to produce ore in economies of scale, many of the large operations there employed electricity. At this time engineers were experimenting with AC and DC currents, and found that both had inherent flaws. Although DC motors were able to meet the rigors of mining, such as stopping and starting under load, DC current could not be transmitted far without a debilitating power loss. On the other hand, though AC current could be transmitted for miles, AC motors could not stop and start under load and were incapable of running machinery that came under sudden drag. As a result, DC current found limited favor, but could only be used close to the point of generation.

In 1895 Stoiber's Silver Lake company set precedent by successfully harnessing AC current and installing the second AC powerhouse in the San Juan Mountains. The Silver Lake company initally distributed the power to its mine in Silver Lake Basin, miles from the powerhouse, as well as to local customers. As other large mines began large-scale developments, the Silver Lake company made its electricity available to them.[9]

It should be noted that during this timeframe a few mining outfits without access to abundant capital pursued an alternative strategy. They sought to remain profitable vis-à-vis silver's low value by simplifying operations and minimizing investment in their infrastructures. By nature, these outfits were small, relied on hand-labor, and produced limited quantities of payrock.

The business generated by mining in the Animas River drainage, especially freighting in supplies and shipping out ore, was brisk and profits were there for the taking. That was the motivation that drew the Silverton Northern Railroad up the Animas River around 1890. The railroad at first connected Silverton with the Silver Lake and other mills, and the town of Howardsville. Later, the railroad was graded farther up the Animas River to Eureka. The railroad's primary business was hauling concentrates to Silverton, where they were transferred for the trip down to Durango.

Around the turn of the century Howardsville was a small mountain town comprised of service businesses such as butchers, freighters, and entertainment establishments, primarily for the area's mines. In the early years, Howardsville had great promise and seemed to hold the potential of being the Animas River drainage's primary town. However, its position began eroding in 1874 when Silverton was not only designated county seat, but also received the only smelters to be built in the river drainage. Howardsville did host two concentration mills during the late 1870s and the early 1880s, but these proved to be failures. As the importance of Silverton grew, the region's commercial and banking businesses gravitated there, and arrival of the Denver & Rio Grande Railroad in 1882 cemented this trend. But because Howardsville was center to a local mining industry and located on the Silverton Northern Railroad, it maintained a population and small business district for some time.

During the 1900s the Silverton area's mines maintained high levels of production, and some of the large operations aroused accolades from the greater mining industry for their application of advanced engineering. But by the early 1910s the mining industry began a pronounced decline and most of the small operations went idle. Nearly 30 years of production had exhausted most of the ore veins. Those companies that survived into the mid-1910s,

[8] "Mining News" *EMJ* 12/29/88 p551; Smith, 1982:98.

[9] "Mining News" *EMJ* 4/26/90 p479; Rickard, 1903:68.

however, were rewarded for their perseverance when the value of silver and industrial metals rose dramatically as a result of World War I. Silver fetched over $1 per ounce by 1917, a value not seen since the Silver Crash of 1893. This encouraged the remaining companies to maximize their production. However, in so doing they gutted their ore bodies. Coupled with the collapse of metals prices and a depression that followed armistice, this forced most mines to close. The World War I era revival of mining ended in 1920, and all but a handful of the largest operations fell silent.

Through the 1920s, a few ventures fitfully attempted to reopen the district's most productive mines, though only a few were successful. Charles Chase was behind the most important effort. In 1926 he began examining the mines around Little Giant Peak and Silver Lake Basin for a group of Missouri mining investors. He determined that profitable ore still existed at great depth. Within a short time the investors empowered Chase to begin driving the Mayflower Tunnel in Arrastra Basin to undercut the ore systems, and almost immediately his miners struck ore. As they pushed the underground workings, not only did the miners penetrate veins that Chase already knew of, but also they found new systems. The onset of the Great Depression in 1929 snuffed out the few mining ventures remaining in the Silverton area, except for Chase's Mayflower operation, due in part to its abundance of low-grade ore.

The victory of Franklin Delano Roosevelt over Herbert Hoover in 1932 for U.S. President set in motion a chain of events that spelled a small revival of mining in the Silverton area. In an effort to devalue the U.S. dollar, in October of 1933 Roosevelt enacted a plan in which the Federal Government bought gold at prices above market value. The gold mining industry responded, and Roosevelt and Congress formalized the measure as the Gold Reserve and Silver Purchase acts early in 1934. The acts set the minimum price for gold at $35.00 per ounce and silver at $.70 per ounce. This stimulated a limited amount of activity in the Animas River drainage. Investors and local individuals examined the principal mines and considered reopening some, but most were truly exhausted and had little ore to offer. However, a few were rehabilitated and brought back into production.[10]

Rehabilitating a mine that had been idle for several decades was not an easy task, nor was it without significant expense. Structures and machinery that had been removed from the old operations had to be replaced, and the mine workings required new timbering and rail lines. During the capital-scarce times of the Great Depression, mining companies attempted to accomplish these tasks with minimal capital investment, and mining in the Silverton area was on a smaller, less glamorous scale than in decades past. In spite of this, a few companies were highly profitable and invested in mechanized operations.

World War II fostered a heavy demand for industrial metals, which mines in the Animas River country had produced in the past. Meeting the wartime demand was an excellent opportunity not only for those companies that weathered the Great Depression, but also for individuals interested in reopening long-abandoned properties. Unlike other silver mining regions in Colorado, however, nearly all of the mines in the Silverton area remained idle. This was due primarily to the old problem of the lack of economically-viable grades of ore.

During the 1950s the region saw the inevitable end to substantive production. Several factors were to blame. First, the demand for metals increased during the prosperous post-war economy of the early 1950s, but their values remained static while inflation increased the costs of production. Second, the nation's interest began shifting from heavy industry and

[10] McElvaine, 1993:164.

manufacturing to business, commerce, and finance, and mining was no longer emphasized. Last, under the Eisenhower Administration, the Paley Commission promoted the acquisition of metals from foreign nations to strengthen economic and political ties in an effort to thwart the spread of communism.[11] As a result the prices of some metals remained artificially low, while the values of silver and zinc actually fell. Given these circumstances, most mines suspended operations.

Still, a demand for industrial metals persisted into the 1960s, and improved technology permitted the extraction and concentration of greater tonnages of low-grade ores than in decades past. In addition, advances in drilling technology permitted mining companies to prospect for mineral bodies through deep core-sampling instead of the traditional and costly method of driving underground workings. A few mining and exploration companies in the Silverton area prospected by examining old workings and deep core-sampling, but most efforts proved unsuccessful, and activity tapered off during the 1970s. Several mines in the Silverton district, however, were found to contain ore and were brought back into limited production. Through close examination and sampling, Standard Metals found ore in the Titusville Mine, which had been idle since around 1890. The company was already working the depths of the Sunnyside property through the American Tunnel, located at Gladstone the Cement Creek valley. Another company reopened the Mayflower Mine and extracted ore for several years. However, within ten years the costs of underground mining exceeded the value of the ore brought to daylight, and these last three operations were forced to close. This ended mining in the Animas River drainage and the region came to depend on tourism interested in an industry that had been the area's economic foundation for more than a century.

[11] Bunyak, 1998:79.

CHAPTER 4: OBJECTIVES AND RESEARCH DESIGN

Objectives

The Gold King Tunnel and Red and Bonita Mine and Mill were re-evaluated to meet several key objectives. The first was to ensure that the proposed remediation work complies with Section 106 (36 CFR 800.5). Both mines had been recorded in 1999, and each was examined again for eligibility to the National Register of Historic Places (NRHP), followed by determination of project effects, in this case the potential impacts of reclamation. Second was to evaluate the resources in terms of the State Register of Historic Properties (SRHP) and the historic landscape. Third was to provide recommendations to guide any further surface work on the sites.

Research Design

The research design outlines several steps required to fulfill the objectives noted above. The first was to gather enough information to re-evaluate eligibility under the relevant designation programs. Section 106 compliance requires evaluation in terms of the NRHP, which is a federally recognized designation program for important historic resources. The SRHP applies only to resources in Colorado and is voluntary. The inventoried resources were evaluated in terms of the SRHP as a secondary recognition of importance and to encourage preservation where relevant. Both designation programs have similar registration requirements. The principal difference is that NRHP Criterion D acknowledges sites with a high potential to yield important information while SRHP Criterion D is reserved for sites of geographic importance. SRHP Criterion E, however, is identical to NRHP Criterion D.

To be eligible for either program, the resources must meet at least one criterion defined by the NRHP and the SRHP. Archival research and the analysis of field data are both essential for objective evaluation under all the criteria. Extensive archival research was conducted in 1999 and the resources were recorded in a manner surpassing Class III standards. Thus, this need not be completed again. The resources must also possess physical integrity for eligibility. A sound assemblage of archaeological features and artifacts can constitute integrity, provided that they clearly represent a resource's history and permit the virtual reconstruction of the mining operation. Dateable artifacts or other attributes are also necessary because establishing timeframe is vital for determining significance. The results are discussed in Chapter 6.

In terms of the criteria, resources may be eligible under NRHP and SRHP Criterion A when associated with events and trends important on national, state, or local levels. Association can only be determined when a resource's timeframe is known. Resources could be eligible under NRHP and SRHP Criterion B if important individuals directly participated in mining operations, or spent appreciable time on the properties. Mere investment in a mining operation or belonging to a company is too indirect an association for eligibility under Criterion B. Resources can be eligible under NRHP and SRHP Criterion C when soundly representing an important type or possessing significant attributes. Resources eligible under NRHP Criterion D and SRHP Criterion E must offer information important to the understanding of prospecting, mining, life on the mining frontier, or the history of Colorado. Sources of information can include surface materials, intact underground mine workings, and buried archaeological deposits and features.

For eligibility, the researcher must explain why the potential information is important and the areas of research it can address. NRHP Criterion G applies to resources less than 50 years old. They must, however, be exceptionally important in type, events, or historical trends.

A third step was to provide meaningful interpretations of the mines. Analysis of material evidence was combined with archival documentation, where available, to draw conclusions about chronology, mining operations, and workers. The two disciplines are neatly complimentary and capable of supporting detailed histories of resources and their workers. By itself, archival information tends to be incomplete and is usually limited to the events, people, and organizations that records-keepers of the past thought important at the time. Some topics considered mundane or taboo are not well-covered in archival sources. Archaeological evidence, in contrast, can address issues that escaped documentation, but it often lacks the information provided by archival sources.

The last step was to examine the resources in the context of proposed Environmental Protection Agency (EPA) remediation, and consider potential effects. In its projects, EPA specifies its remediation plans, taking into account mine opening, waste rock dump, drainage, site size and location, environmental conditions, access restrictions, and budget. The most common methods for addressing water-quality issues related to waste rock are run-on/runoff controls (diversion ditches), contouring and revegetation, and removal to a repository. Tunnel effluent is usually diverted into a settling pond, percolated through limestone, or treated in a small plant. Underground plugs are rarely used because of their complexity. EPA also specifies how the resource will be accessed and the work conducted, whether by hand or with heavy equipment. The above methods all have characteristic impacts, the specifics of which vary for each resource. Access routes, staging areas, and the resources themselves constitute the area of potential effect. When a resource is recorded, understanding the project's area of potential effect is a prime consideration. Management recommendations are provided (in this report) to guide the most appropriate method with respect to the resource and overall effect. For resources recommended here as eligible for the NRHP, advised remediation seeks to maintain integrity and present no adverse effect. This can be achieved when disturbance and alterations are limited to non-supporting features and portions of a resource, where relevant. For resources recommended not eligible, any remediation method may be acceptable, although management recommendations offer alternatives in the interest of preserving some resources anyway. When an adverse effect on an eligible resource is unavoidable, resolution will be sought through mitigation.

CHAPTER 5: RESEARCH METHODS

Archival Research

Archival research is a necessary step to objectively evaluate the significance of any resource, whether intact or severely damaged, in terms of the NRHP and the SRHP. Further, the significance of a resource under Criteria A and B can only be determined when its history and that of the surrounding area are known. MSH ordinarily conducts extensive research following fieldwork for these reasons, however, this was unnecessary for Red and Bonita and Gold King Tunnel. MSH had already completed exhaustive research for the two sites in 1999.

A search was conducted on the Office of Archaeology and Historic Preservation's Compass database to determine if additional information had been added to the site records. Nothing new was found.

Field Methods

The Red and Bonita was re-evaluated in the field to fulfill several goals. The first was to document impacts from remediation work between 2010 and 2012. Second was to clarify the site's physical integrity and contributing versus noncontributing elements. Last was to fill gaps and convert the official Need Data eligibility finding into a positive for NRHP Criterion D.

Field methods to achieve the above were fairly simple. Eric Twitty recorded the Red and Bonita in 1999, and had detailed field notes, maps, site descriptions, and memory for comparison with the site as it was in 2014. Documenting the remediation project's impacts required comparison of the 1999 information with the site's present feature and artifact assemblages. Changes were photographed and plotted on a draft of the 1999 site map, and discussed in Chapter 6. Clarifying physical integrity was accomplished by evaluating the ability of the site's archaeological features to convey the mine, mill, and workers' housing complexes. Those features unable to convey what they had been during the site's operating period are assumed to be noncontributing, while all others are contributing. As noted in Chapter 1, Twitty's 2000 report did not distinguish between contributing versus noncontributing elements. Thus, reconstructing what was contributing at that time is an important exercise in evaluating the remediation project's impacts. Reconstruction was accomplished through site records and memory. When brought together, the above information is able to fill gaps for an eligibility determination.

The Gold King Tunnel was not re-evaluated in the field for this 2015 report. Bulldozing during the 1960s and late 1980s destroyed almost all historic attributes, and the site was officially determined ineligible. Examination of the site again was unnecessary because the site lacks integrity and is ineligible, no meaningful information would be forthcoming. The matter was discussed with the Office of Archaeology and Historic Preservation, and the 1999 site records are sufficient for re-evaluation here.

CHAPTER 6: INVENTORY RESULTS

Both the Red and Bonita Mine and Mill and Gold King Tunnel are included in the Red and Bonita environmental remediation project. The resources are summarized in Table 6.1, and discussed in detail below. Both mines were recorded as archaeological sites in 1999 and re-evaluated below. Prehistoric resources were not encountered either adjacent to the sites or along corridors likely to be used for access. The two sites are adjacent to in-use two-track roads and will be accessed by vehicle, with heavy equipment participating in the work.

Table 6.1: Red and Bonita Project Resource Summary

Site #	DRMS#	Resource Name	Resource Type		Eligibility
			Site	IF	
5SA.632	None	Red and Bonita Mine and Mill	X		NRHP Criterion D
5SA.649	None	Gold King Tunnel	X		No; Poor integrity

Site 5SA.632
Red and Bonita Mine and Mill

The Red and Bonita Mine and Mill is an archaeological site representing a marginally successful mining and milling operation. The site includes four complexes of archaeological features: an upper tunnel, a main tunnel, an ore concentration mill, and workers' housing. The resource qualifies as an archaeological site because all buildings, structures, and large artifacts were removed long ago, with archaeological features and small artifacts now representing much of the operation. The site is located on the east side of Cement Creek's main fork. The tunnel and mill complexes lie on a steep west-facing slope, while the workers' housing complex is immediately below on the drainage floor. At 11,000' elevation, the tunnels and mill are surrounded by subalpine fir and spruce forest interspersed with meadow, while the residential complex is a swampy mix of meadow and ferricrete mineral deposits (iron-based cement). A gravel road graded with a bulldozer during the 1950s passes between the mill and workers' housing and descends to Gladstone. Figures 6.2-6.4 are the original 1999 site maps, marked with changes from work in 2010-2012. Figure 6.2 depicts the upper tunnel, far removed from the rest of the site. Figure 6.3 is the main site's western half and Figure 6.4 the eastern half, originally a one-piece fold-out.

Eric Twitty with Mountain States Historical recorded and evaluated the site in 1999 as noted in Chapter 1. The site was discussed in the 2000 report *Mining Cement Creek: A Selective Inventory of Historic Mine Sites on the East Side of the Cement Creek Drainage, San Juan County, Colorado*. Consult the report for the full, original site description and referenced history.

Red and Bonita Mine and Mill History

The Red & Bonita Mining & Milling Company bored the upper tunnel as a prospect in 1896 and struck a gold and silver vein. Confident in the vein's profitability, the company hired a

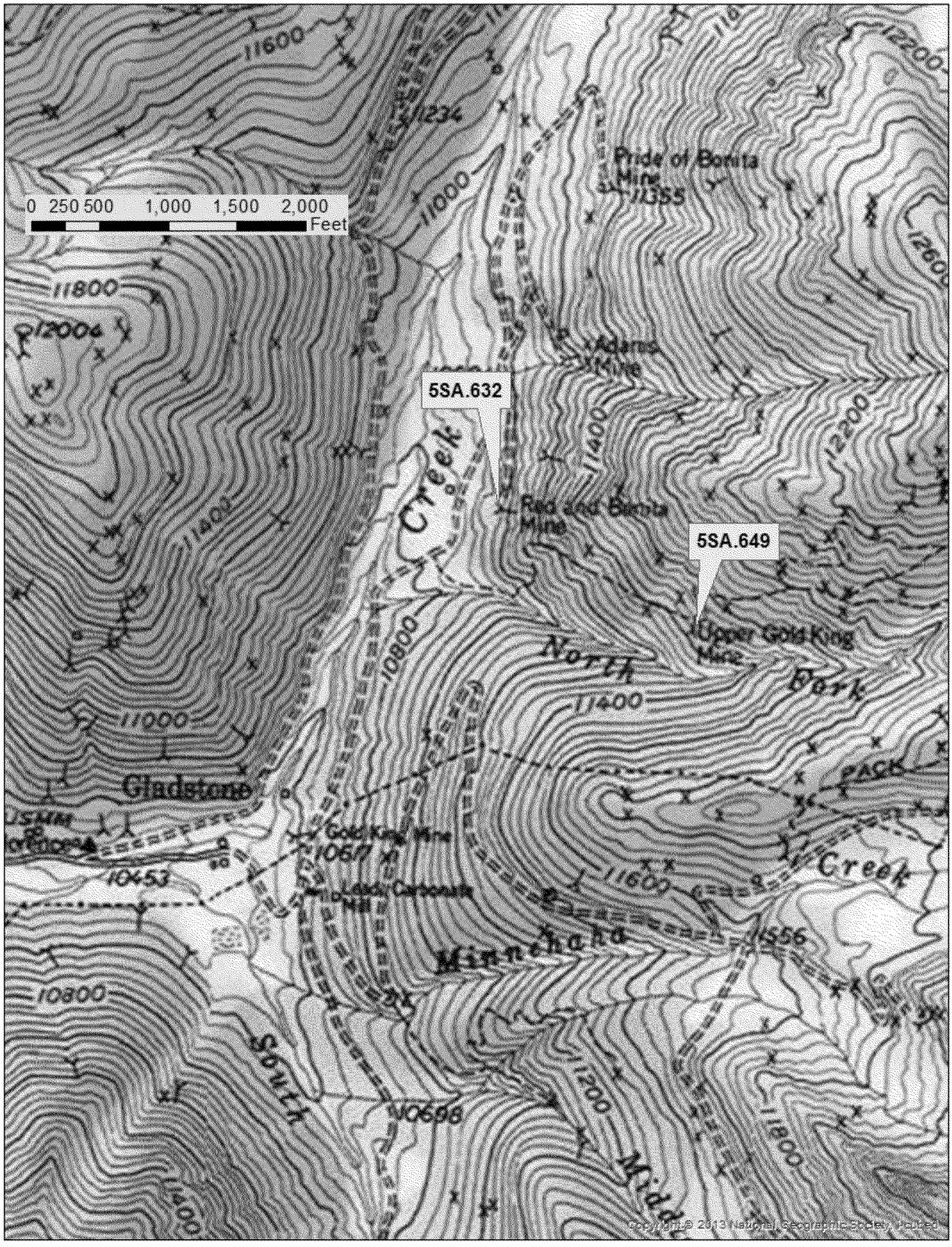

Figure 6.1: The map, an enlarged, digital version of Ironton (7.5') 1955, depicts the Red and Bonita Mine and Mill (5SA.632) and Gold King Tunnel (5SA.649).

crew of twenty miners next year, who bored the lower tunnel and brought the vein into production. In 1898, the company constructed an ore concentration mill, a large boardinghouse, and an office. In the mill, two Gates crushers provided primary crushing, a 10 stamp battery completed secondary crushing, two sets of rolls reduced the material into slurry, and jigs and Frue vanners separated out waste. Two steam engines powered the machinery and heated the building. The mill ran only intermittently because the ore proved too complex, and the company shipped most of the ore in crude form until closure around 1903. The tunnel portal had collapsed and the buildings were in decay by 1905.[12]

[12] Twitty, 2000:21.

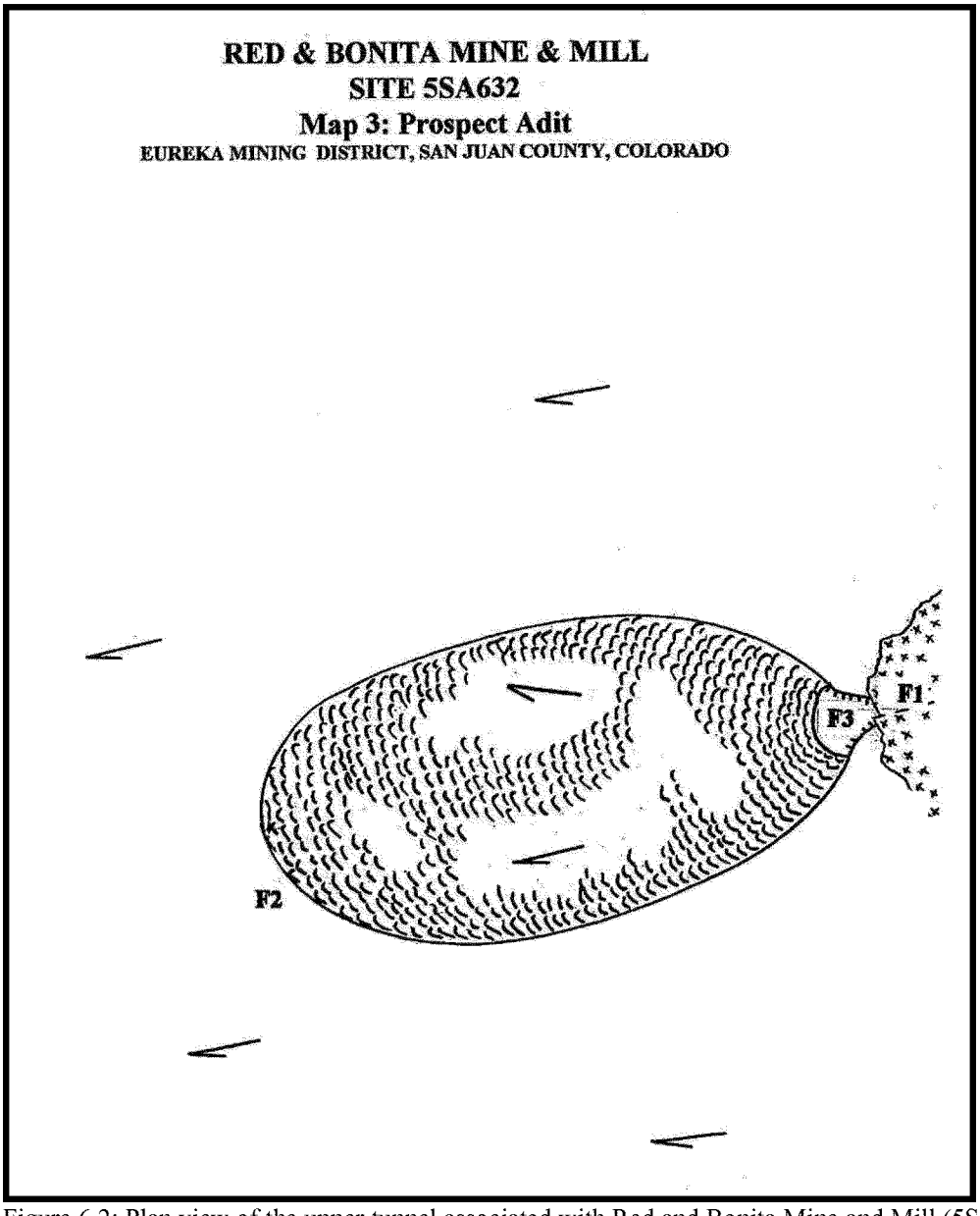

Figure 6.2: Plan view of the upper tunnel associated with Red and Bonita Mine and Mill (5SA.632). The tunnel will be avoided by the cleanup and project and has not been affected by work completed 2010-2012.

Overview and Integrity of Red and Bonita Mine and Mill in 1999

When Twitty recorded the site in 1999, he identified four complexes of archaeological features: the upper tunnel driven in 1896, the main tunnel bored in 1897, the 1898 mill remnants, and the 1898 workers' housing ruins. The upper tunnel was the simplest complex and had the best integrity (see Figure 6.2). The complex included the tunnel, its waste rock dump, and a track exiting the tunnel (F1-F3). Integrity was good in 1999 with all features well-preserved, including the tunnel, which was open.

The main tunnel complex had little integrity because of bulldozing during the 1990s. As noted in Twitty's 1999 feature descriptions, the tunnel portal (F4) had collapsed decades before and manifested as a subsidence zone. During the 1990s someone graded a road south to the tunnel and scraped the waste rock dump's top-surface, destroying evidence of nearly all surface facilities. The only identifiable features included a privy pit (F6), charred stumps from an ore chute (F8), and ore bin foundation (F9). The dump retained its original footprint and profile, but not the top-surface because of the bulldozing. A century of highly mineralized drainage issuing from the tunnel's subsidence coated the dump's north flank and a portion of the ore bin foundation with ferricrete and sediment. Having burned, the ore chute was little more than a difficult-to-identify alignment of partially buried stumps.

Twitty's 2000 report did not specify the main tunnel complex's integrity at the time. But it can be clarified here that the complex retained poor integrity in 1999 because of deterioration and the bulldozing. The ore chute remnant was difficult to interpret because only a few charred stumps were left, and the ore bin foundation was merely a mound of mineralized rock retained by several courses of log cribbing. Evidence of the most important facilities expected at tunnels such as a tunnel house, blacksmith shop, and rail line were completely gone. Further, nearly all artifacts had either disintegrated or been destroyed during bulldozing. Given this, the remaining features were unable to convey the tunnel, its surface plant, and their role in the production of ore. At the time, the tunnel and the waste rock dump's top-surface were noncontributing elements of the site. The rest of the dump was, however, a strong contributing element and a landscape icon.

The mill complex (F10-F16) was poorly preserved in 1999, a handful of difficult-to-interpret archaeological features approximating the mill's ore treatment flow-path while conveying few specifics. An incomplete platform (F10) partially buried and swamped with ferricrete represented the mill's head, with a timber foundation remaining from a primary crusher, probably one of the two gyratory units noted in the history above. A second platform (F12) approximately 30' downslope supported the stamp battery, marked by a timber pedestal (F12). The platform was partially buried. The main platform (F13) was the most robust feature, at one time supporting the mill's concentration equipment and engine room. The platform was a flat, rectangular area 50'x70' in area with distinct foundations for a steam engine (F14) and its boiler (F15). Nothing denoted the concentration machinery or the mill building's footprint, which would have encompassed the entire complex.

The 2000 report noted several deficiencies with the complex. All the platforms were blanketed with rubble and debris, and a road had been bulldozed through the complex's upper portion, possibly affecting features there. More importantly, another road was bulldozed past the main platform's downslope edge, damaging some features including a boiler clinker dump (F16) and the main platform itself. In addition, the main platform's north portion had been scraped, but

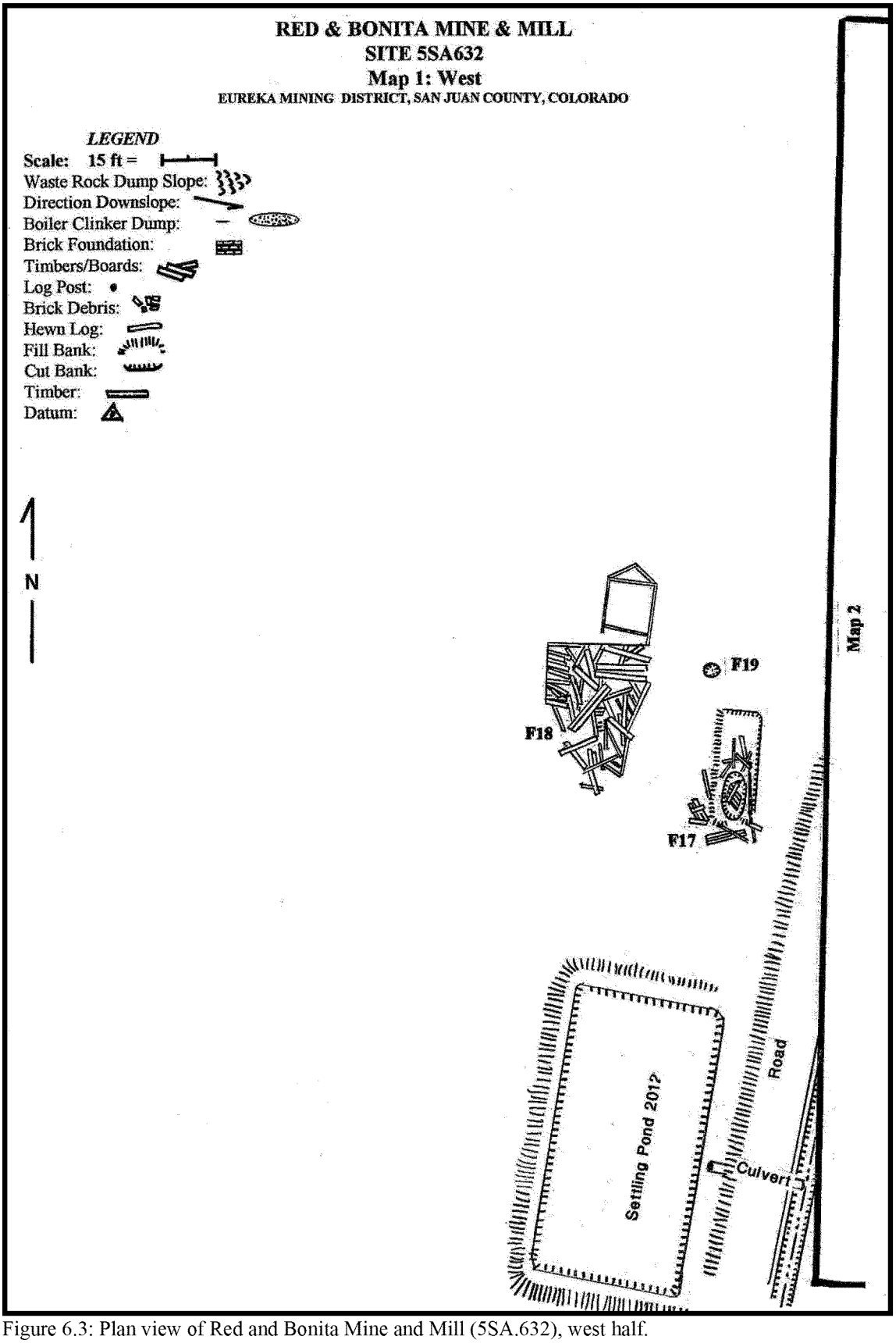

Figure 6.3: Plan view of Red and Bonita Mine and Mill (5SA.632), west half.

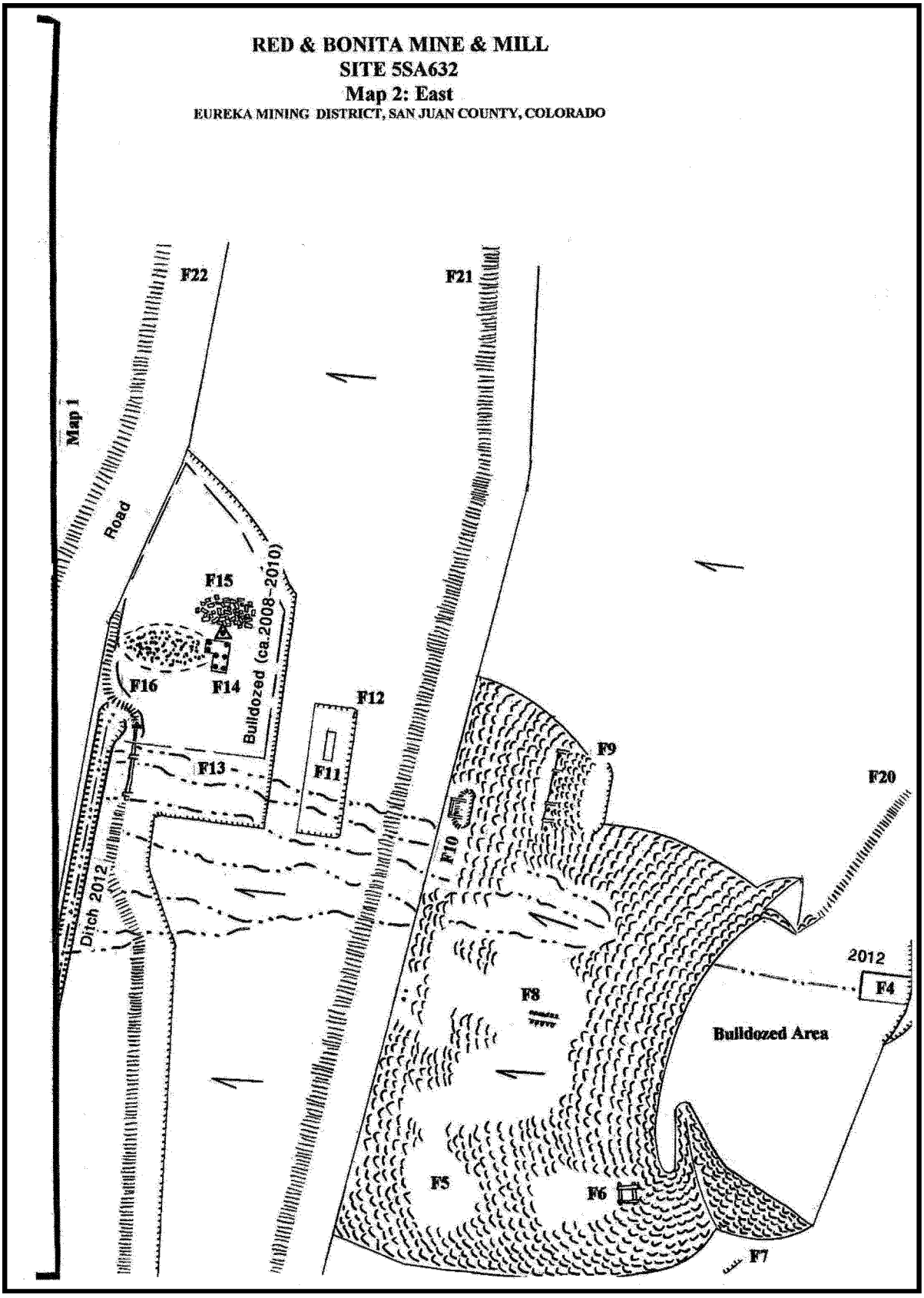

Figure 6.4: Plan view of Red and Bonita Mine and Mill (5SA.632), east half.

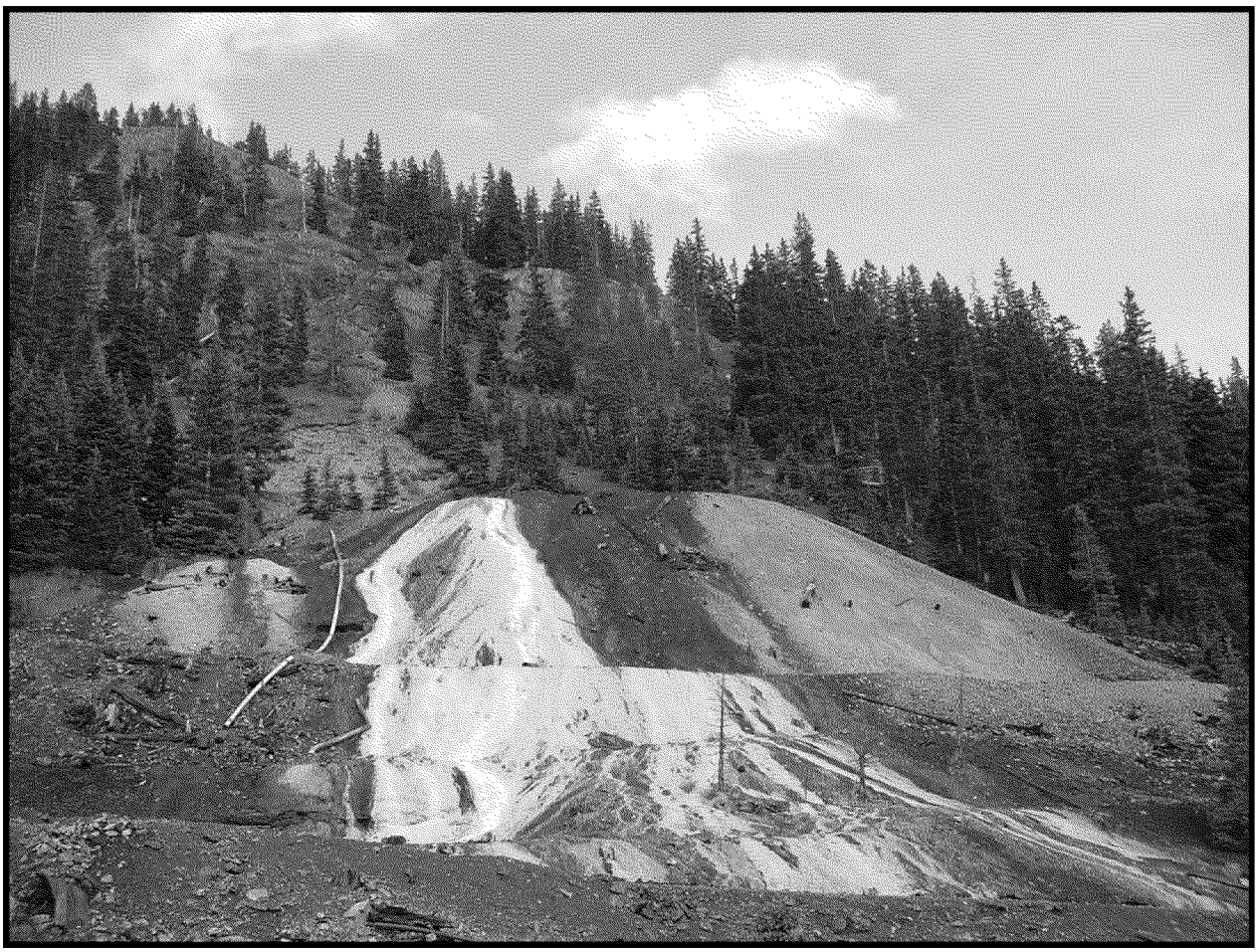

Figure 6.5: East overview of Red and Bonita (5SA.632). Difficult to perceive, the mill platforms (F10-F16) are on the dump's left portion.

the engine and boiler foundations were left intact. The complex's artifact assemblage was sparse but representative of milling.

In sum, the mill complex's integrity was poor in 1999. The only clearly identifiable features were the main platform and machinery foundations, while the other features were difficult to distinguish. Further, the features did not possess cohesiveness as a whole, being separated by barren slopes of earth, rubble, and waste rock with no apparent connectedness. Given this, the complex only vaguely suggested the presence of a mill at one time, without conveying the building or ore processing stages. In terms of integrity, the aspects of design and association were not clear, while materials and workmanship were absent. The mill complex was a noncontributing element of the site at the time.

The workers' housing complex was the most intact group of archaeological features. A platform and a ruin (F17 and F18) clearly conveyed 15'x30' boardinghouses, while a pit (F19) remained from a privy. The platform was well-formed and distinct with a collapsed root cellar, and the boardinghouse ruin had enough debris to convey the building's design, association, materials, and workmanship, as well as details such as plumbing and electric lighting. Further, the artifact assemblage was rich enough to reveal aspects of the occupants such as diet, liquor consumption, and presence of a family. The buried archaeological potential was noted in 1999,

with the platform and ruin probably offering yard deposits, and the root cellar and privy pit deeper deposits.

In general, the site offered mixed integrity in 1999. The main tunnel complex suffered almost complete disturbance, and its few remaining features conveyed little of its function as an underground entry and point of production. The mill complex consisted of poorly preserved features no longer representing the design, function, association, materials, or workmanship of an ore treatment plant. Only a few fragmented aspects were readily interpretable. The workers' housing complex, however, clearly conveyed the design, association, materials, and workmanship of the boardinghouses, as well as details of their occupants.

In the 2000 report, Twitty recommended the site eligible for the NRHP under Criteria A, C, and D. The original significance statement is as follows:

"The Red & Bonita Mine & Mill site is eligible for listing in the National Register of Historic Places. The site possesses only a moderate degree of historical integrity. Within recent decades someone used a bulldozer to grade roads to the tunnel portal and across the flank of the waste rock dump, as well as scraping down the waste rock dump's surface. In addition, the road passing through the site was widened numerous times. Despite the disturbance, the site meets Criteria A, C, and D. In terms of Criterion A, the mine is associated with events that have made a contribution to the broad pattern of our history. The site encompasses a substantial operation that was part of a revival of mining in the Eureka Mining District late in the Gilded Age. Within this context, the mine helped to indirectly promote mining in the area, as well as contributing to the area's economy. The mine also indirectly contributed to the overall pattern of the industrialization and settlement of the mountainous West. The mine also indirectly participated in the advancement of mining and milling technology. The mine relied on electricity for lighting at a time when electrical technology was in a nascent state. Part of the mine's participation included purchasing power from a distance source, which necessitated being linked to an electrical grid. The mining company erected an ore concentration mill to treat the mine's complex ore. The mill included several then-unconventional machines for crushing and concentration, including Gates gyratory primary crushers, and Frue vanners. While the mill was a failure, it provided engineers with empirical data on effective and ineffective processes.

"In terms of Criterion C, the Red & Bonita Mine & Mill embodies the distinct characteristics of a turnkey operation that extracted ore and concentrated it on-site. The site also serves as an example of a mine and mill at which workers lived. While the site consists of archaeological remains, the scope and nature of the former mining and milling operation can be ciphered out of the extant material evidence.

"In terms of Criterion D, the site may yield further data. Excavation of the privy pit and the cellar pit in the residential complex may provide data that can enhance current understanding of life in mountain mining districts.

"The recommendations for treatment involve testing the privy pit and the cellar pit for subsurface deposits. Because much of the site has been heavily impacted by bulldozing, further disturbance is unlikely to have a significant detrimental impact, except to the residential complex."[13]

The last statement creates an inherent conflict. If the site was heavily impacted by bulldozing, which it was, then integrity would be insufficient to support eligibility under Criteria A and C. But the residential complex still offers buried archaeological deposits and a good surface artifact assemblage, justifying Criterion D.

[13] Twitty, 2000:30.

Overview of Environmental Remediation 2010-2012

Red and Bonita did, in fact, experience further disturbance twice between 2010 and 2012. In 2010 EPA reopened the collapsed main tunnel with heavy equipment in preparation for the underground plug. The agency scraped the waste rock dump's top-surface and dug away rubble from the opening, piling the material to the north and south. EPA then reinforced the new tunnel portal with an arched corrugated sheet iron culvert. The area had been previously bulldozed during the early 1990s and was a noncontributing portion of the site. The existing bulldozed road was used for access. In either 2010 or 2011, a contractor bulldozed the main mill platform (F13), destroying the steam engine foundation, boiler foundation, and boiler clinker dump (F14-F16). Recent refuse, including plastic lining used in settling ponds, was subsequently left on the surface, which flash-flooding then heavily eroded.

In 2012 DRMS conducted more earthmoving for an effluent collection system. Effluent was allowed to cascade down the waste rock dump's flank in braided streams, as it had always done. But a new ditch along the main road's upslope edge caught the water and carried it south. The ditch, approximately 2' wide and 1' deep, was graded along the road with backdirt piled on the road's tread to avoid disturbing the site. A short distance outside the site's southern edge, the ditch reached a plastic culvert directing the water into a settling pond on the road's western side. The pond is approximately 45'x82' in area ringed by backdirt berms approximately 10' wide. The culvert and pond are both outside the site's southern edge and a short distance south of the workers' housing complex, which has been completely avoided.

Condition and Integrity of Red and Bonita Mine and Mill in 2014

As of 2014, the site is still poorly preserved. Its general condition has not changed since 1999 except for the earthmoving and improvements described above. All work has been restricted to noncontributing portions of the site. Tunnel improvements remained within previously bulldozed ground, while the effluent collection ditch was dug along a road bulldozed through the site decades ago. The culvert underneath the road and the settling pond downslope and west are immediately outside the site's southern boundary. The only noteworthy loss was destruction of the steam engine and boiler foundations on the main mill platform, which was apparently bulldozed prior to the remediation project according to project managers. And even then, the platform is a noncontributing element.

The site retains poor integrity because of deterioration and bulldozing during the 1950s, 1990s, and 2010-2011. The tunnel and mill complexes do not convey their general design, association, materials, or workmanship. The workers' housing complex, however, possesses design, association, materials, and workmanship. Overall, the large mineralized waste rock dump and workers' housing complex together impart some feeling of mining, and the site is in an intact mining landscape.

Figure 6.6: View southeast of the mill platforms (F10-F16) in 2010. The main platform is in the foreground, and the low mound at right is a steam engine foundation while the mound at left is the boiler foundation (F13-F15). The platform is poorly preserved and the foundations are deteriorated, blanketed with earth and mineralized deposits, and difficult to interpret. The foundations were scraped away in 2010 or 2011.

Red and Bonita Mine and Mill Eligibility Recommendations

The site was recommended eligible for the NRHP under Criteria A, C, and D in the 2000 report as noted above. The BLM's official eligibility determination was Need Data because conflicting statements about the site's condition and integrity were unable to support Criteria A and C. The 2014 re-evaluation has demonstrated that integrity was, in fact, insufficient for Criteria A and C at that time, and integrity has not improved. Thus, the site is recommended ineligible under Criteria A and C. The existing archaeological features no longer convey the site's association with important historical events and trends, and the site is not a good archaeological example of its resource type, a combination tunnel mine and ore concentration mill.

But the site is recommended eligible for the NRHP under Criterion D and the SRHP under Criterion E. As stated in the 2000 report, the workers' housing complex offers buried archaeological features likely to contribute information important to our understanding of people and their lifestyle on the mining frontier. In particular, testing and/or excavation of the deposits

will probably enhance the current knowledge of diet, substance abuse, health, lifestyle, gender, ethnicity, and socio-economic status of mine workers in the Rocky Mountains, circa 1895-1905.

Red and Bonita Mine and Mill Management Recommendations

Most surface improvements for the remediation project were completed 2010-2012. In 2015, EPA proposes enlarging the settling pond and installing the concrete plug underground within the tunnel. MSH recommends expanding the pond south and west to keep activity out of the site boundaries and away from the workers' housing complex. Heavy equipment, likely a small track-hoe, will be used for the enlargement. When the plug is installed, a concrete truck will park on the existing road below the tunnel and pump slurry into the tunnel via a flexible hose. The tunnel itself will be accessed on the road leading to it, as before. The additional work is supported here because further earthmoving will be off-site, most work confined to within the tunnel, and existing roads providing access for vehicles. The project will have no adverse effect.

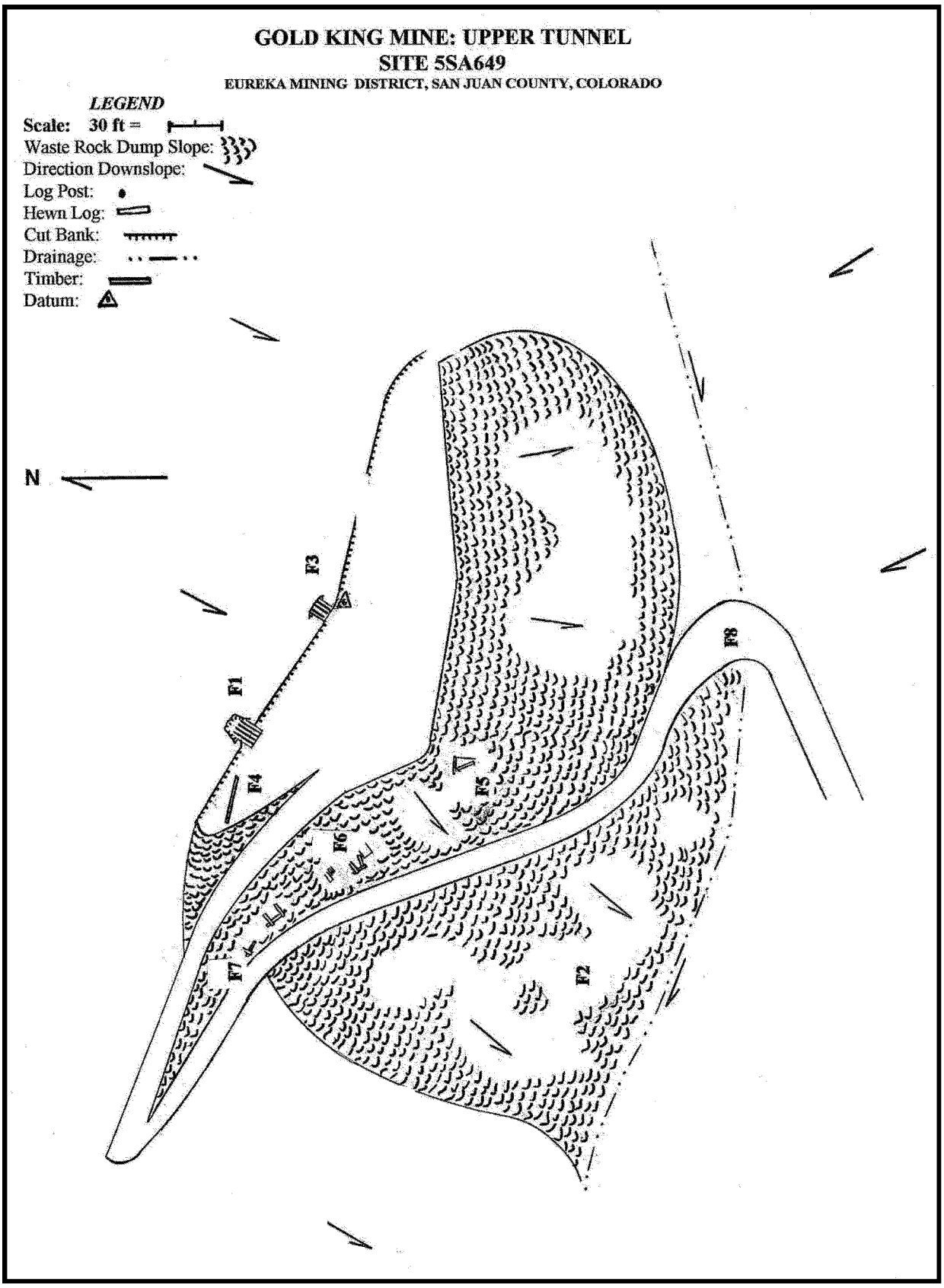

Figure 6.7: Plan view of Gold King Tunnel, 5SA.649.

Site 5SA.649
Gold King Tunnel

The Gold King Tunnel is a heavily disturbed archaeological site. At one time, the Gold King was among San Juan County's important gold producers, and had a substantial surface plant consisting of a tunnel house, blacksmith and machine shop, compressor air system, aerial tramway terminal, and other facilities. During the late 1980s, a second tunnel was driven to circumvent the then-collapsed original entry, and the waste rock dump and surface plant area were bulldozed. To provide vehicle access to the site, the operator graded a road up the waste rock dump's flank. The earthmoving compromised the site's integrity by erasing nearly all historic features. The site is on the north wall of Cement Creek's North Fork, 11,400' elevation. The drainage is overgrown with subalpine fir and spruce forest grading into an alpine meadow.

Eric Twitty with Mountain States Historical recorded and evaluated the site in 1999 and discussed it in the 2000 report noted in Chapter 1.[14] Consult the report for the full, original site description and referenced history.

Gold King Mine History

The Gold King Mine ranked among San Juan County's principal gold and silver producers from 1890 until 1924. A local miner discovered the Gold King Vein in 1887, proved rich ore through prospecting, and then sold to W.Z. Kinney and investors in 1890. A mining expert, Kinney gradually developed the vein and built a small test mill at Gladstone (Site 5SA.16), on the valley floor far below. Satisfied that the vein would pay well, Kinney organized the Gold King Mining & Milling Company in 1895 for capital, and put the money into major improvements over the next two years. The company drove the Gold King Tunnel in 1896, developed several bonanza veins, and erected an aerial tramway down to an enlarged mill at Gladstone a year later. The mine then joined the county's top producers, and although the Gold King Tunnel itself changed little, the Gladstone facilities saw several noteworthy improvements. In 1900, the company bored the American Tunnel (Site 5SA.16) at Gladstone and doubled the mill's capacity to match the greater output. In 1902, the mill received an electrical plant, one of the county's largest air compressors, and a special tailings processing circuit. The Gold King Tunnel, American Tunnel, and mill then ran continuously until 1924, when profitable ore was gone.[15]

In 1959, Standard Metals Corporation took an interest in the Gold King property, both for the ore in the veins and to drive the American Tunnel far easterly underneath the old Sunnyside Mine. The company completed underground rehabilitation and development, and brought both sets of workings into production during the early 1960s. The Gold King Tunnel yielded ore for several years at the least, and then closed. In 1986, a new mining outfit filed an operating permit to work the tunnel, but because the tunnel had collapsed, they bored a second, adjacent entry around the broken ground to intersect the old workings. Standard Metals and the new outfit each took their toll on the site, destroying nearly all historic features with earthmoving, surface improvement, and deposition of waste rock. The last outfit ceased during the early 1990s and the tunnel eventually collapsed.[16]

[14] Twitty, 2000:85.
[15] Twitty, 2000:86.
[16] Twitty, 2000:86.

Overview and Integrity of Gold King Tunnel in 1999

When Twitty recorded the Gold King Tunnel in 1999, he identified late 1980s improvements and a few archaeological features from the original operation. The late 1980s improvements included a new tunnel portal (F1), a transformer station (F4), and a storage building where the old, collapsed tunnel had been (F3). The last outfit completely bulldozed the waste rock dump (F2), which no longer exhibited its original footprint, profile, or surfaces. The earthmoving erased all traces of original surface facilities except for a low log cribbing wall and timber foundation elements (F6) from the aerial tramway terminal, and a second partial log cribbing wall (F7) on the dump's southwestern flank. Remnants of a dead-end rail trestle (F5) dating to the 1960s or the late 1980s were on the dump's southern flank. The road bulldozed up the dump for access was preserved. The only historic artifacts to survive had collected on the drainage floor south and below the site. In his 2000 report, Twitty clearly stated that the site had almost no integrity and was unlikely to yield further information upon study.

Condition and Integrity of Gold King Tunnel in 2014

Although re-evaluated in the 2015 report, the Gold King Tunnel was not physically inspected for several reasons. First, the site had almost no integrity in 1999 because earthmoving and mining erased all historic attributes except for two severely damaged cribbing walls. Integrity was permanently compromised, and a current site assessment would contribute little new information. It can be assumed that the site is still in very poor condition and lacks integrity.

Second, EPA added the Gold King Tunnel to the greater Red and Bonita project after the 2014 field season came to an end. Physical inspection of the Gold King would have waited until the 2015 field season, pushing EPA's project back possibly into 2016. Twitty discussed the matter with OAHP in early 2015, and was granted permission to include the site's re-evaluation in this report without a site inspection.

Gold King Tunnel Eligibility Recommendations

Twitty recommended the Gold King Tunnel ineligible in his 2000 report, and BLM officially concurred. The following statement copied from the report applies to both the Gold King and American Tunnel (5SA.16), which Twitty discussed together:

"The Gold King Tunnel and the American Tunnel sites are not eligible for listing in the National Register of Historic Places. Despite meeting Criteria A and B, the sites possess virtually no historical integrity, and they will probably not yield further information."

Although the Gold King is officially ineligible, clarification on Twitty's 2000 statement is warranted. Under Criterion A, the Gold King was important in its time as a major gold producer, employer, contributor to the local economy, and operation where advanced technology was implemented. In terms of Criterion B, several locally important engineers and operators were directly involved in the operation and spent time on the property. But without integrity, the site does not convey its association with the important events, trends, and people. Regarding Criterion C, the site is not a good example of its resource type, a tunnel mine, because nearly all historic attributes have been erased. Under Criterion D, the site will not yield important

information upon further study because features and artifacts were thoroughly documented, and buried archaeological deposits are absent.

Gold King Tunnel Management Recommendations

EPA will include the Gold King Tunnel in the greater Red and Bonita remediation project. The Red and Bonita Mine and Mill (5SA.632) is approximately 1,600' northwest and 400' lower in elevation, and EPA plans on plugging the main tunnel there in 2015. EPA expects the local watertable to rise and possibly back up into the old Gold King workings. Thus, EPA intends on reopening the Gold King Tunnel and cleaning it out for monitoring purposes. Reopening the tunnel could release water and sediment presently backed up in the interior. A collection and diversion system will prevent uncontrolled flow into the North Fork, and instead carry the water over to a settling pond at the Red and Bonita. Heavy equipment will scrape away waste rock in front of the portal and dig a shallow ditch to a collection dam on the dump's shoulder. The dam will, in turn, direct water into a flexible plastic pipe descending overland to the Red and Bonita settling pond. Earthmoving for the project is restricted to the tunnel portal, less than 50 years old, and the waste rock dump, lacking integrity. Vehicles will access the Gold King along the existing bulldozed road. The reclamation project is supported here because the site lacks integrity and is recommended ineligible. In terms of Section 106, the project will have no effect.

CHAPTER 7: HISTORIC LANDSCAPES AND POTENTIAL DISTRICTS

As conveyed in Chapter 1, the Red and Bonita Mine and Mill and Gold King Tunnel are not only being re-evaluated for their historical significance and project effects, but also for their potential to contribute to historic landscapes and historic districts. The landscapes and districts are defined below.

In general, a historic landscape is a collection of resources reflecting related land use patterns, culture, industry, and important events and trends. A historic landscape should feature distinct elements of time-period land use characteristics, an intact natural setting, and resources with integrity. In terms of the project area, these qualities should clearly convey prospecting and mining 1875-1920. Character-defining features can include but are not limited to prospects, mines, structures, buildings, archaeological remnants thereof, claim monuments, primitive roads, packtrails, and disbursed artifacts.

A historic district is a cohesive body of resources unified by place, time, theme, and historical trends. Further, that body must be historically significant. The area within the historic district cannot have been disrupted by significant modern intrusions, and the district should convey a sense of the past. To contribute to a historic district, individual resources must be sufficiently preserved on an archaeological level or better. Further, most but not all the resources within the district must be contributing elements.

In context of the above, Red and Bonita has landscape and district potential but Gold King does not. The Gold King is concealed in the deep North Fork of Cement Creek drainage, which lacks a good viewshed and greater assemblage of resources with visual presence. In addition, Gold King does not possess sufficient integrity for inclusion in a district.

Red and Bonita, on the other hand, is located among a good assemblage of mining resources lining both sides of Cement Creek's main fork. Prospects, mines, and other resources scattered for two miles along the drainage, from Gladstone at the south to Ross Basin at the north, convey a feeling and association of the region's mining industry. A relatively undisturbed alpine environment provides a characteristic setting. But because the resources are scattered and far apart in some cases, further study is necessary to define the landscape's quality and extent. Red and Bonita contributes because its waste rock dump is visually prominent, and EPA's proposed remediation project will not affect the site's visibility. The landscape has district potential, but inventory is required to identify contributing versus noncontributing resources.

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